Evaluating alloy differences through hardness testing right on the production line

This application note describes how to test hardness of alloys on the production line with portable hardness testers.

In the automotive industry, it is necessary to check the coils just before starting production, for example, the materials DB 800 or DB 1000. A way to see the differences accurately is to use the Equotip 550 Portable Rockwell by comparing various hardness measurements.

Direct-indentation method to evaluate differences between alloys

The Equotip 550 is mainly used for measuring the true hardness value of metals with its feature to convert into hardness scales such as Brinell, Vickers or Rockwell. However, it is also used to evaluate the differences between alloys.

The portable method has been developed in the early 90s in order to enable users of heavy benchtop devices the measurements outside of the laboratories since the lightest bench-top Rockwell machines are heavy and can not be transported easily. Currently, the portable Rockwell is standardized in ASTM (ASTM E3246) and DIN (50157).

Fast, accurate checks on the production line

Among all portable measurement techniques, the portable Rockwell is most suited because it is based on a direct-indentation method and is material-independent.

Direct indentation means simply that no conversion from one physical property to another takes place e.g. like for Ultrasonic Contact Impedance (UCI) whereby the frequency shift of the oscillating rod is correlated with the hardness through a correlation curve. Hence a prior knowledge of material's Young modulus is required in order to evaluate and compute the correct hardness of the material.

The native scale is for portable Rockwell is micrometre and this is exactly what is directly measured - how deeply the indenter has penetrated the material. The investigation can be conducted by fulfilling the basic measurement requirements regarding the surface preparation without the knowledge of the exact material composition.

The Equotip 550 device allows a quick and comfortable check right on the production line, thus providing a very time- and cost-efficient solution compared to standard laboratory testing.

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